Demonstrating a four-qubit network for the surface code with superconducting qubits[1] SRIKANTH SRINIVASAN, EASWAR MAGESAN, JERRY CHOW, JAY GAMBETTA, ANDREW CROSS, NICHOLAS MASLUK, DAVID ABRAHAM, NICHOLAS BRONN, CHRISTOPHER LIRAKIS, MATTHIAS STEFFEN, IBM TJ Watson Research Center — In the skew-symmetric layout of superconducting qubits and resonators for the surface-code error correction protocol, studying an inner ring structure of four qubits is a critical step towards demonstrating the core operations of a full plaquette tile. We show results for quantum devices consisting of twelve quantum degrees of freedom: four transmon qubits, coupled via four bus resonators, with four independent readout resonators. We discuss engineering challenges of such devices as well as benchmarked results for control and readout.

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